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Sensory testing of cigarette smoke. Panel selection, training and use. Diss. Abstr. Int. B.

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Ninety-three volunteers of different ages, smoking habits, and of either sex were considered as candidates for panel training and selection. Primary taste tests were employed during training to familiarize the potential panelists with the four taste qualities, sweet, salt, sour and bitter. There was no significant difference in taste sensitivity between smokers and non-smokers or between cigarette smokers and non-smokers. Selection of a panelist was based on his ability to detect three types of differences similar to those that might be encountered during the actual testing of experimental cigarettes. Selection techniques were designed not only to qualify subjects as panelists but also to train them on how to detect difference becomes smaller. Panel training continued by measuring the panelist's response (correct identification of the odd cigarette) to changes in smoke flavor due to added sugar and to added nicotine malate, each at four different concentrations. The relationship between panel response and the added concentrations of either additive was linear when response was plotted against log-concentration, suggesting conformance with the Weber-Fechner Law. A method was developed to determine the panelist's just-noticeable-difference significant at the 5% level ( $JND_{0.5}$ ) for added sugar and for nicotine malate. The  $JND_{0.5}$  was 11 mg sugar per gram of tobacco and 6.7 mg nicotine malate (3.65 mg nicotine) per gram of tobacco, already containing 15.8% sugar and 2.14% nicotine. With proper training the number of performing panelists can be reduced. A panel of 15 individuals performed as well as did a panel of 21. A 15-member panel was then used to elucidate the qualitative differences (two identical cigarettes and one different or odd) was employed. The subjects were asked to follow the order of presentation and to use a suggested smoking technique while taking the tests. All smoking tests were conducted under controlled conditions (in the booths) and cigarette marking was used as a physical method to control the amount of stimulus (smoke). Of the 36 subjects who completed the required smoking tests (15 triangles), 30 had a discriminating ability beyond the chance probability and, hence, were qualified as panelists. Correlation studies showed that cigarette smokers were more likely to have discriminating ability, to detect differences between the test cigarettes, than pipe and cigar smokers than non-smokers. In triangle smoking tests, the subjects responded correctly more often when the odd is not in the middle, and the effect of the position of the odd becomes more prominent as the difference in smoke flavor of experimental cigarettes to which equivalent supra-threshold amounts of "free" nicotine and "bound" nicotine (nicotine malate) had been added. The panel response in four triangles indicated a significant difference in smoke flavor attributed to the two forms of nicotine. Even with only two triangles, the panel was able to detect the difference. When the panelists were permitted to take the test cigarettes ad libitum instead of in-booth, the differences was not detected. The panel's high performance was due not only to the panelists themselves (training) or the type of difference to be detected by also to the three-fold criterion of sensory testing: test materials, test procedure and test conditions.

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